



**EASA**  
European Aviation Safety Agency

# Safety Risk Management for the European Aviation Safety Plan

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AD Workshop

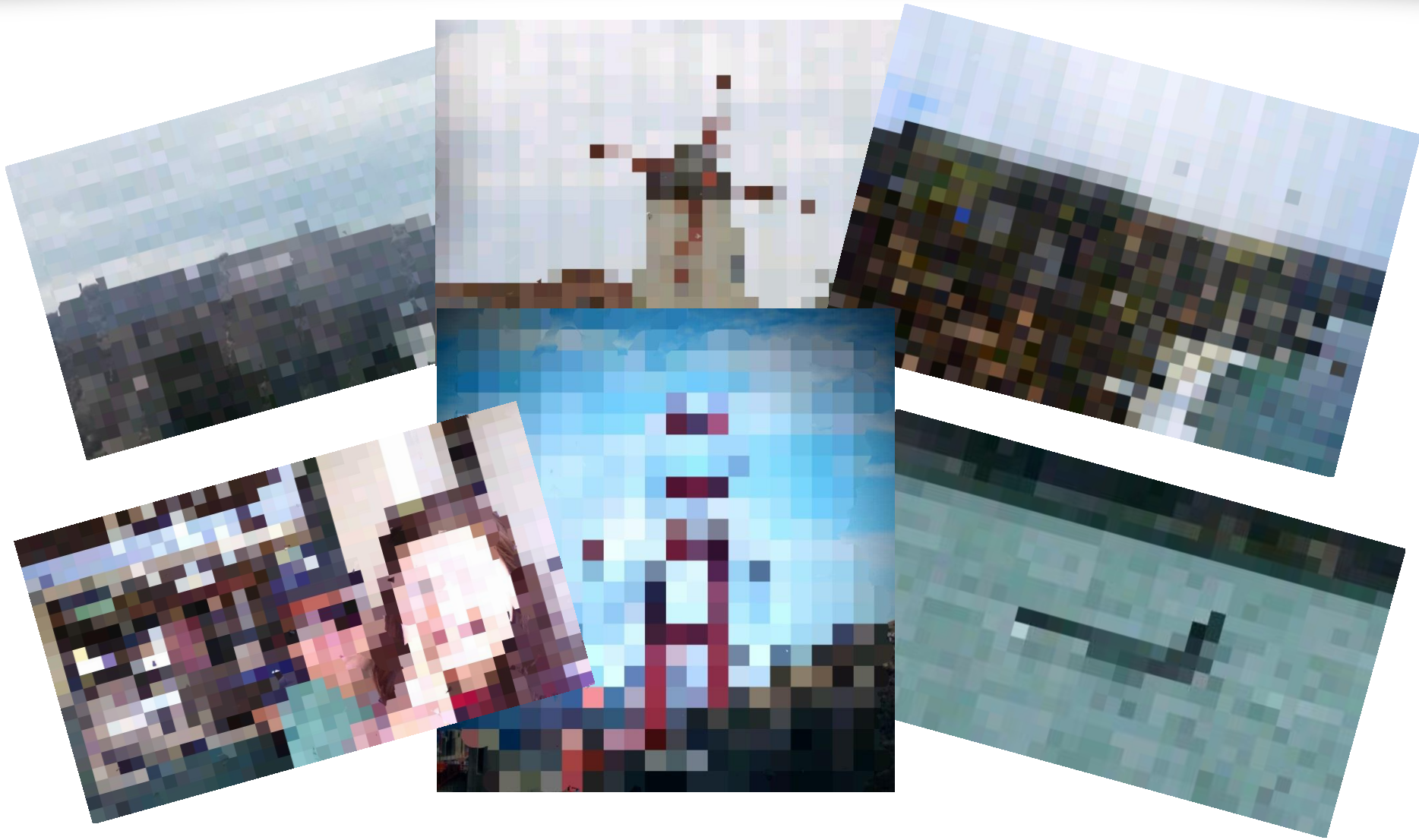
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# Let's start with something interesting





# Information is Nothing if You Can't Use It

- My holiday photos tell you nothing because there is no detail to them
- The same is true with occurrence reporting and the way we use information to make decisions for the European Plan for Aviation Safety
- Without good information and a clear plan on how to use it how can we decide on the best strategic safety actions
- This is the purpose of the Safety Risk Management (SRM) Process



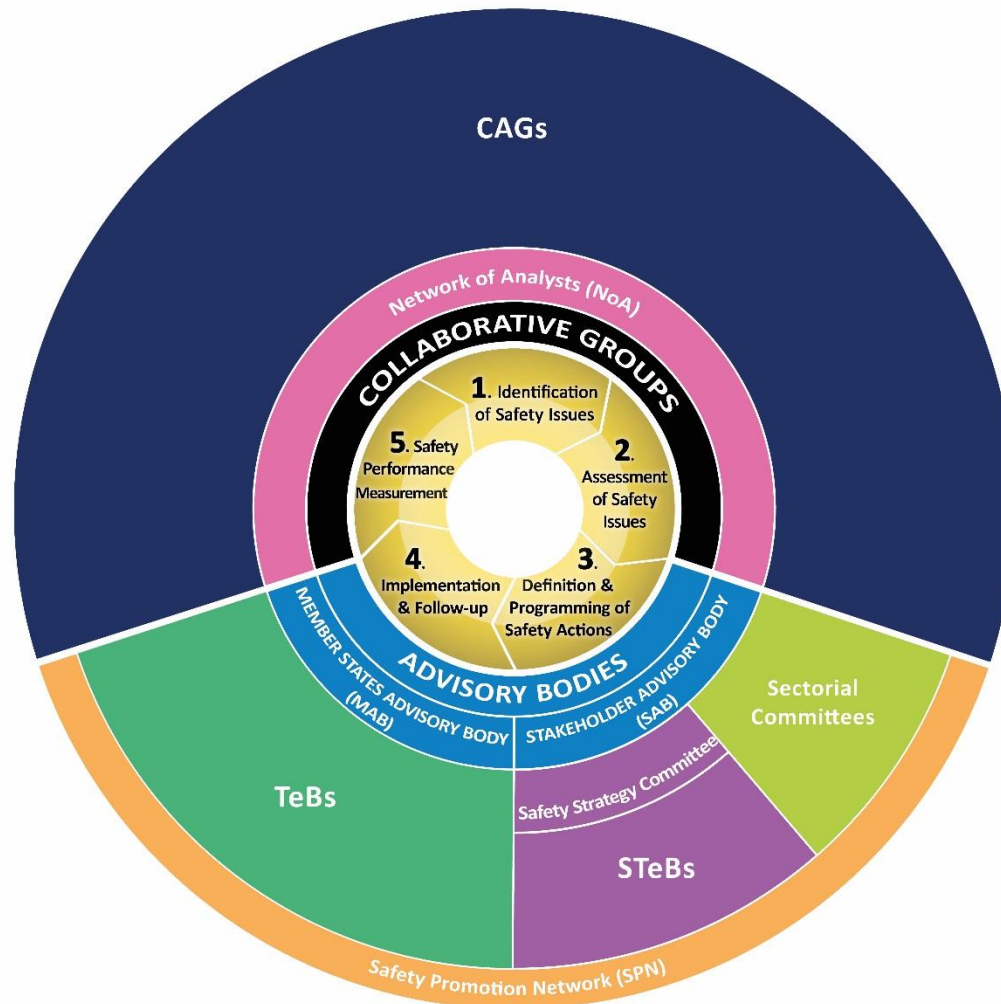
# The Safety Risk Management Process



- Objective: Provide a mechanism for EASA, NAAs and industry to support a **data-driven** approach to safety as part of the EPAS



# Who Does What?



# COLLABORATIVE GROUP PLANNING

## NETWORK OF ANALYSTS

3 Times Per Year (Mar/ Jun/ Oct)

John Franklin and Ionut Florian

### CAT Aeroplanes CAG

Established March 2016

3 Per Year (Mar/ Jun/ Oct)

Santiago Haya Leiva

### Offshore Helicopters CAG

Established November 2014

2 Per Year (Feb/ Sep)

Richard Canis

### Balloons CAG

Established March 2015

1 Per Year (Mar)

Yngvi Yngvasson

### ATM/ ANS CAG

To Be Established January 2017

3 Per Year (Mar/ Sep/ Dec)

Jose-Luis Garcia Chico

### Other CAT/ AW Helicopter CAG

To Be Established in 2017 (EMS)

1 Per Year (TBD)

Richard Canis

### GA Aeroplanes CAG

To Be Established March 2017

2/3 Per Year (Feb/ May/ Nov)

Yngvi Yngvasson

### Aerodromes and Ground Handling CAG

To Be Established February 2017

2 Per Year (Feb/ Sep)

Martin Bernanderesson

### GA Helicopters CAG

To Be Established in 2018

2 Per Year (TBD)

TBD

### Gliders CAG

To Be Established April 2017

2 Per Year (Apr/ Oct)

Yngvi Yngvasson

### Design/ Production/ Maintenance CAG

To Be Established in 2017

Frequency TBD

Owner TBD

### Human Factors CAG

To be Established in Early 2017

2 Per Year (Mar/ Oct)

Rowen Powel

### UAS CAG

Concept/ Need to be Established

Frequency TBD

Owner TBD





# CAGs - Managing the Safety Risk Portfolios



## 1 - CAT AEROPLANES SAFETY RISK PORTFOLIO

Key Statistics 2006-2015  
Fatal Accidents – 11  
Fatalities – 642

### Key Risk Areas



(1)  
Recognition and Recovery from Abnormal Attitudes



(3)  
Handling of Technical Failures



(4)  
Ground Handling Operations



(1)  
Recognition and Recovery from Abnormal Attitudes



(6)  
Flight Planning, Preparation and Re-Planning



(2)  
Operation in Adverse Weather



(4)  
Ground Handling Operations



(5)  
Maintaining Safe Separation

(2)  
Operation in Adverse Weather

(7)  
Aircraft Maintenance

(5)  
Maintaining Safe Separation

(2)  
Operation in Adverse Weather

(9)  
False or Disrupted ILS Signal Capture

(5)  
Maintaining Safe Separation

(15)  
Dangerous Goods Handling and Lithium Batteries

(6)  
Flight Planning, Preparation and Re-Planning

(4)  
Ground Handling Operations

(14)  
Damage Tolerance to UAS Collisions

(9)  
False or Disrupted ILS Signal Capture

(6)  
Flight Planning, Preparation and Re-Planning

(13)  
Deconfliction with Aircraft Not Fitted with Transponders

(8)  
Fuel Management and Planning

(10)  
Birdstrikes

(11)  
Handling of Go-Arounds

(11)  
Handling of Go-Arounds

(13)  
Deconfliction with Aircraft Not Fitted with Transponders

(12)  
Erroneous Data Parameters

(12)  
Erroneous Data Parameters

(12)  
Erroneous Data Parameters

### Operational Issues

### HF

(a)  
Personal Readiness/Impairment

(b)  
Perception and Awareness

(c)  
Decision Making and Planning

(d)  
CRM and Communication

(e)  
Monitoring of Flight Parameters/Automation

(f)  
Knowledge of Aircraft Systems and Procedures

### Enablers

Regulation and Oversight

SMS Effectiveness

Occurrence Reporting (Reg 376)

Just Culture

Analysis and Safety Risk Management

Safety Performance Monitoring

Communication of Safety Intelligence



# Tasks of the Collaborative Groups

- Identification and assessment of emerging and candidate Safety Issues
- Definition of analysis tasks and risk assessment
- Sharing of data and intelligence to support analysis
- Assessment of Safety Issues in the Domain Safety Risk Portfolios
- Monitoring of Safety Performance
- Developing improvements to occurrence reporting and other enabling activities





# Outputs of the Collaborative Groups

## ➤ Safety Risk Portfolios

- Highlighting the Key Risk Areas (Outcomes) to be prevented in each domain
- Safety Issues

## ➤ Reports

- Candidate Safety Issue Assessment
- The assessment of Safety Issues or Key Risk Areas with prioritized safety action proposals for EPAS
- Performance monitoring through the EASA Annual Safety Review with CAG input



# Link to the Advisory Bodies

- Output from CAGs to Advisory Bodies
  - Safety Risk Portfolios and new Safety Issues
  - Prioritised work programme
  - Reports on Safety Issue Assessment with proposals for potential EPAS actions
- Role of the Advisory Bodies
  - Provide input and strategic direction to Collaborative Groups (Safety Issues/ Priorities)
  - Approval of agreed actions through the EPAS
  - Definition and implementation of EPAS actions



# European Risk Classification Scheme

- ERCS mandated by Regulation (EU) 376/2014 to be implemented by May 2017
- Development tasked to EASA from the European Commission in late 2014
- Development Group established - includes involvement from Design and Maintenance organisations
- 6 meetings held in 2015 to develop initial ERCS matrix
- Task 1 on initial development of the ERCS matrix was completed in 2015
- Task 2 for 2016 now focusses on refining the processes, testing, guidance, training material and implementation



# Key Points of Implementation

- Regulation (EU) 376/2014 only requires the Competent Authorities to use the ERCS
- Organisations can use any recognised/ documented risk classification scheme
- This means if you already have an occurrence risk classification process ERCS does not change anything for you or your organisation
- ERCS is however designed to be simple and attractive to encourage as many organisations as possible to use it
- One thing is vital – good risk classification requires good reporting and investigation processes



# ERCS Matrix

X/10	X/9	X/8	X/7	X/6	X/5	X/4	X/3	X/2	X/1
1.00E-03	0.01	0.10	1	10	100	1,000	10,000	100,000	1,000,000
S/10	S/9	S/8	S/7	S/6	S/5	S/4	S/3	S/2	S/1
5E-04	5E-03	0.05	0.5	5	50	500	5,000	50,000	500,000
M/10	M/9	M/8	M/7	M/6	M/5	M/4	M/3	M/2	M/1
1E-04	1E-03	0.01	0.1	1	10	100	1,000	10,000	100,000
I/10	I/9	I/8	I/7	I/6	I/5	I/4	I/3	I/2	I/1
1E-05	1E-04	1E-03	0.01	0.1	1	10	100	1,000	10,000
E/10	E/9	E/8	E/7	E/6	E/5	E/4	E/3	E/2	E/1
1E-06	1E-05	1E-04	1E-03	0.01	0.1	1	10	100	1,000
A/0									
10	9	8	7	6	5	4	3	2	1
1.E-09	1.E-08	1.E-07	1.E-06	1.E-05	1.E-04	1.E-03	1.E-02	1.E-01	1.E+00
remaining barriers predicted to fail 1 in 1,000M times	remaining barriers predicted to fail 1 in 100M times	remaining barriers predicted to fail 1 in 10M times	remaining barriers predicted to fail 1 in 1M times	remaining barriers predicted to fail 1 in 100,000 times	remaining barriers predicted to fail 1 in 10,000 times	remaining barriers predicted to fail 1 in 1,000 times	remaining barriers predicted to fail 1 in 100 times	remaining barriers predicted to fail 1 in 10 times	Realised accidents





# Levels of Potential Accident Outcomes

Potential Accident Outcome
Extreme catastrophic accident with significant potential fatalities (100+)
Significant accident with significant potential for fatalities and injuries (19-100)
Major accident with potential for some fatalities/life changing injuries (2-19) or major aircraft destroyed
Single Individual fatality/life changing injury or substantial damage accident
Minor and Serious Injury (not life changing) accidents and Minor Damage
None

Large CAT – High Energy

Large CAT – Low Energy  
Small CAT – High Energy

Small CAT – Low Energy  
GA – Certified Aircraft

Uncertified Aircraft  
Maintenance/ Ground Handling



# Process – Based on 2 Questions

- Question 1 - What is the most credible accident outcome?
- For the occurrence being scored, if it had escalated into an accident, what type of accident would it have been? (Importantly, this is an accident outcome and not what actually happened – the ERCS is designed to address potential risk)
- Process broken into 2 steps



# Question 1 – Step 1

- Consider occurrence being scored and determine the most credible accident outcome
  - Damage and Injuries
  - Airborne Collision
  - Aircraft Upset
  - Excursions
  - Runway or Taxiway Collisions
  - Obstacle Collisions
  - Terrain Collisions
  - Unsurvivable Aircraft Environment



## Question 1 – Step 2

- From the Outcome Category the Degree/ Seriousness (the row score) is calculated depending on the aircraft involved
- Criteria based on the size/ capacity of the aircraft (not actual number of passengers)
  - Large Commercial Aircraft (CS25) 100+ POB
  - Small Commercial Aircraft (CS25/29) 19-100 POB
  - Small Ac (CS23/27) less than 19 POB
  - Small Ac (Uncertified) less than 19 POB
  - No aircraft - potential for fatalities/ injuries



## Process – Question 2

- What is the likelihood of the occurrence escalating into the potential accident outcome
- Uses a weighted barrier model for each outcome category
- Barriers Score – First two below give the score
  - Stopped/ Worked – prevent accident
  - Not Reached/ Expected to Work – likely to have prevented the accident if it had been reached
  - Not Applicable – not relevant to occurrence
  - Failed





# Barrier Model

- Each Accident Outcome (Key Risk Area) has a number of barrier models for different scenarios
- For Example: Aircraft Upset
- Sub Scenarios: Crew Factors, Environmental Factors, Flight Preparation, Technical Factors
- Example below for Crew Factors

Equipment Design, Maintenance and Correct Operation	Regulations, Procedures, Processes and Compliance	Situational Awareness and Action	Top Event Occurs	Warning System Operation and Compliance	Recovery/ Avoiding Action	Protection	Worst Possible Outcome	Final Score
5	3	2	Aircraft Deviates Normal In-Flight Parameters	3	1	1	1	16
Aircraft/ Equipment	Flight Ops	Flight Ops		Flight Ops	Flight Ops	Flight Ops		1
							1	



# Some Observations

- The ERCS process requires information
- Therefore it will require improvements to the reporting and investigation process – e.g. better guidance on what information to provide for different types of occurrence
- ERCS will lead to
  - Changes to taxonomy – part of current Strategic Taxonomy Review
  - Update to mandatory fields and list of reportable occurrences in Regulation 376



## Further Work

- Further testing and refinement of ERCS Matrix and Process
- Develop easy translation from other Risk Classification Processes (e.g. ARMS/ RAT)
- Develop supporting guidance and training material
- Support technical implementation in ECCAIRS, SMS Software and provide standalone tools
- Support ERCS evolution and develop longer term reporting improvements



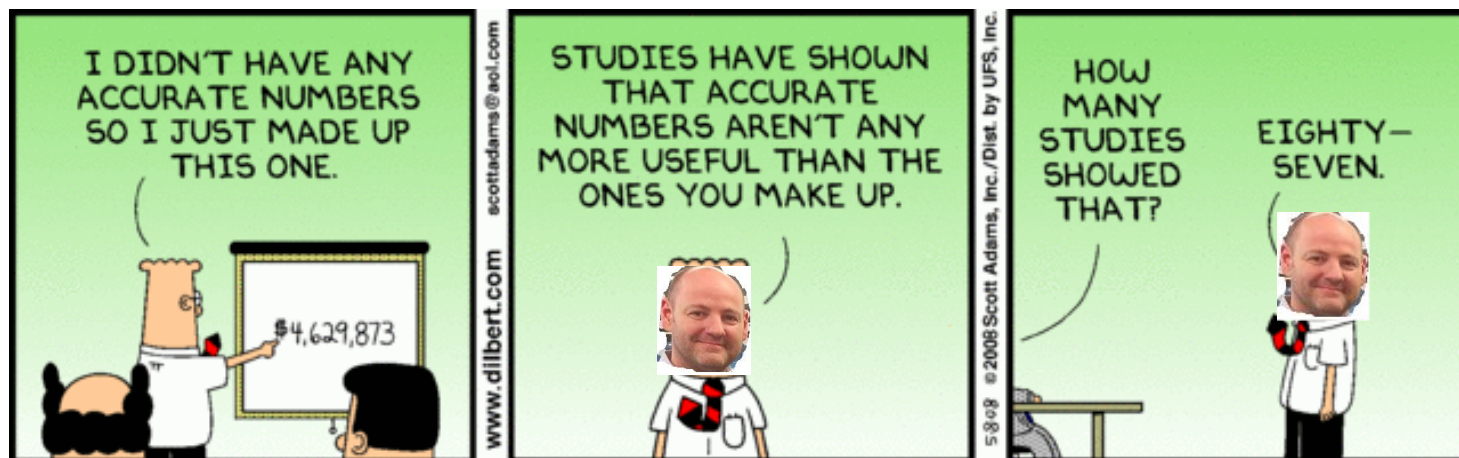
# Relationship to Airworthiness Risk Process

- ASD are group members (Airbus and Dassault) and have develop mapping process against AMC 25.1309 scale of criticality
- Two processes measure different things and ERCS is largely focussed on operational events
- ASD have developed an initial proposal to link the criticality and time to action from AMC 25.1309 to the column score in the ERCS
- Initial testing has led to positive correlation and further work to be completed

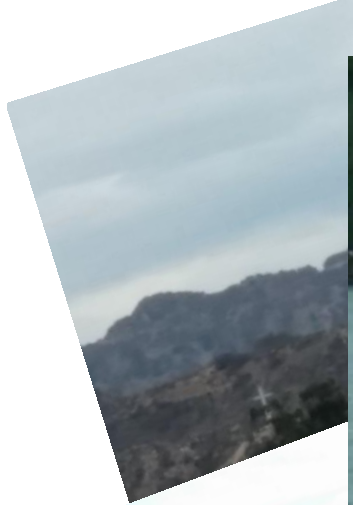


# Information at the Heart of Good Decisions

- Collecting all this information is good but.....
- It is what we do with that information and who we share it with that counts
- Information collected from reporting will be shared with industry through a range of outputs









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# Comments or Questions?

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